MISCELLANEOUS. No. 197.c.

M.R.C. War Memorandum No. 8

THE PROPERTY OF
THE WELLCOME BUREAU
OF SCIENTIFIC RESEARCH.

Medical Research Council:
Committee on the Care of
Shipwrecked Personnel

A GUIDE TO THE PRESERVATION OF LIFE AT SEA AFTER SHIPWRECK

WELLCOME INSTITUTE LIBRARY
Coll. WelMOmec
Coll.
No.

Crown Copyright Reserved

LONDON
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE
To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
York House, Kingsway, London, W.C.2; 120 George Street, Edinburgh 2;
39–41 King Street, Manchester 2; 1 St. Andrew's Crescent, Cardiff;
80 Chichester Street, Belfast
or through any bookseller

1943

Price 4d. net

COMMITTEE ON THE CARE OF SHIPWRECKED PERSONNEL

(Appointed by the Medical Research Council)

Surgeon Vice-Admiral Sir SHELDON DUDLEY, K.C.B., O.B.E., M.D., F.R.C.P., F.R.S., K.H.P. (*Chairman*)

Surgeon Rear-Admiral G. GORDON-TAYLOR, C.B., O.B.E., M.S., B.Sc., F.R.C.S.

Surgeon-Captain M. CRITCHLEY, M.D., F.R.C.P., R.N.V.R.

A. N. DRURY, M.D., F.R.S.

Surgeon-Commander R. A. GRAFF, M.R.C.S., L.R.C.P., R.N.

Sir THOMAS LEWIS, C.B.E., M.D., F.R.C.P., F.R.S.

R. A. MCCANCE, M.D., Ph.D., F.R.C.P.

Air Commodore T. MCCLURKIN, M.B., B.Ch.

Squadron Leader T. F. MACRAE, D.Sc., Ph.D.

SPENCER NAIRNE, M.R.C.S., L.R.C.P.

Captain R. OLIVER-BELLASIS, R.N.

B. S. PLATT, M.B., M.Sc., Ph.D. (*Secretary*)

Terms of Reference; and Acknowledgments

The Committee on the Care of Shipwrecked Personnel was appointed in October 1941, *at the request of the Medical Department of the Navy, to examine the conditions to which Naval and R.A.F. personnel may be exposed after loss of ships or aircraft, when they may be adrift in boats or rafts or isolated in the desert: to examine the physiological aspects of those conditions, with special reference to water requirements, exposure to extremes of heat and cold, food requirements and stimulants, and to frame practical recommendations.*

In view of the interest to the Committee of the measures developed by the Ministry of War Transport for promoting the survival of crews of merchant ships sunk by enemy attack, and the interest to the Ministry of the questions dealt with by the Committee, the Ministry agreed, at the request of the Admiralty, to nominate one of their Medical Inspectors of ships as a member of the Committee.

In the preparation of this pamphlet, the Committee has had expert help from various sources; and it is desired particularly to acknowledge that given by Commander N. D. Holbrook, V.C., R.N., and Commander J. Quayle, R.D., R.N.R.

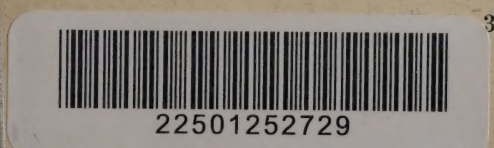
WELLCOME INSTITUTE LIBRARY
Coll. welMOmec
Call No. pam.
N:
WA292
1943
M48g

A GUIDE TO THE PRESERVATION OF LIFE AT SEA AFTER SHIPWRECK

CONTENTS

	PAGE
INTRODUCTION	4
Purpose of Guide	4
Leadership and Morale	4
Records of Survival in Recent Months	5
ROUTINE PREPARATIONS AND PRECAUTIONS IN THE SHIP	5
Drinking water and containers; Food and containers: First Aid outfit; Portable wireless transmitter and receiving set; Lamps; Matches; Canvas and cordage: Plugs; Wooden fittings; Wire steering grommets; Painter; Semi-rotary pump	
Habits	6
ACTION IN EMERGENCY	6
Minimising the effect of explosions	6
ABANDONING SHIP	7
Wireless messages and equipment	7
Instruments, nautical tables and charts	7
Clothing	7
Extra water	7
Food	7
Release of life-saving appliances	7
Going Overboard	7
In the Water	8
PROCEDURE IN LIFEBOAT	8
Routine	8
Behaviour; Allocation of duties; Clothing; Protection against cold winds, rain and spray; Protection against sun and heat; Pumping and baling	
Water Rations	9
Control and issue; Measures; Collection of rain-water; Sea ice; Drinking urine	
Food Rations	10
Care of Stores	10
Habits	10
Drinking and eating; Bowels; Urination; Smoking	
Sleep	11
Energy Tablets	11

	PAGE
THE TREATMENT OF SICK AND WOUNDED	12
First Aid Equipment and Emergency Treatment	12
Treatment of apparent drowning (The Schafer method of artificial respiration)	13
Emergency treatment of wounds	15
Emergency treatment of broken bones	15
Burns and scalds (including sunburn blisters and rope burns of the palms)	16
Treatment of shock	16
LIFEBOAT AILMENTS	16
Dry mouth	16
Cracked and parched lips	16
Cracked skin (from exposure to sun, or incrustation with salt)	17
Salt-water burns (boils)	17
Inflammation of the eyes (from flash-burns, fuel oil, sunglare, etc.)	17
Fever	17
Vomiting	17
Constipation	17
Diarrhoea	17
Difficulty of urination	17
Swollen legs	17
Frostbite	17
Immersion foot	18
STEPS TOWARDS RESCUE	19
Navigation	19
Pulling	19
Attracting attention	20
Mirages	20
TREATMENT AFTER RESCUE	20
Drink	20
Food	20
Warmth	20
Treatment of frostbite	21
Treatment of immersion foot	21


22501252729

INTRODUCTION

Purpose of Guide

The experiences of survivors from shipwreck have been accumulating during the war; careful study of these records shows that with knowledge, foresight and initiative the chances of survival can be increased, bodily discomfort reduced, spirits cheered, and morale maintained during exposure, and the general state on rescue improved. The Committee has examined the conditions to which men may be exposed at sea after the loss of ships or aircraft, and has combined—in the form of a pamphlet or "guide" for seafarers—the lessons to be learnt from practical experience with the conclusions reached from experimental work. This presentation has been chosen, instead of a formal report, as being the most effective means of disseminating information in a direct manner to those exposed to risk. Most of the information applies to survivors in lifeboats, but much of it is applicable to those depending on other life-saving appliances such as rafts, Carley floats and rubber dinghies. The Committee knows of no publication comprising similar information, but the Ministry of War Transport Notice No. M191* and Statutory Rules and Orders, 1942, No. 1519,† contain information of a complementary nature and should be read in conjunction with the present pamphlet.

The value of passing on the experiences of sailors surviving shipwreck has long been recognised. One hundred and fifty years ago a seaman's guide was published which collected together various accounts of survivors from shipwreck, as well as accounts of men and animals surviving periods of deprivation of food and water. Much of the advice given at that time is as good to-day as when it was published; this will be seen from the following quotations:—

> "Hope, perseverance and subordination should form the seaman's great Creed and Duty, as they tend to banish despair, encourage confidence, and secure preservation. . . ."
>
> ". . . great deal may be done by management and good conduct to alleviate sufferings and distress. . . ."
>
> ". . . warmth of clothing has frequently had a happy tendency to lessen sensations of hunger and to prevent colds and disorders. . . ."
>
> ". . . the effects of Hunger and Thirst are greatly overcome when the Apprehensions about them are banished."
>
> ". . . in numberless voyages there are the strongest proofs of how small a quantity of either (sleep and food) will sustain the lamp of life for a long period."
>
> ". . . men and animals . . . have been miraculously preserved for a length of time without sustenance, or, if any, on the slightest pittance possible, and that more frequently from a little moisture than from food."

The information given in the following pages is a product of the pooled knowledge of sailors and scientists, and combines a great body of seafaring experience with the results of research and of the submission of volunteers to experiments under rigorous conditions. There are thus both practical and scientific reasons for believing that if the suggestions made here are followed, the comfort of shipwrecked crews and their chances of survival will be increased.

This pamphlet should be studied particularly by officers of the Royal Navy and Merchant Navy. It is hoped that it will be useful also as a textbook in nautical schools, and that Medical Officers will make use of it for teaching purposes.

Leadership and Morale

Almost everything depends on the bearing and conduct of the officer in charge. He must be calm and confident, able to assume responsibility, assign jobs to each,

* *War Time Safety Measures. Notice to Ship Owners and Ship Masters and to Owners and Skippers of Fishing Vessels.*

† *Merchant Shipping* (*Life-Saving Appliances*) *Emergency Rules.* July, 1942 (H.M. Stationery Office, 4d.—5d. by post).

deal unhesitatingly with contingencies as they arise and take full charge of rations, navigation and boat-work. To assume this responsibility with success requires knowledge and foresight, and the information given in this pamphlet will help the officer to achieve this desirable leadership. Officers will increase their own confidence by assiduously taking all available small boat practice beforehand.

In the event of shipwreck, strict discipline must be maintained and if necessary vigorously enforced. Every member of the lifeboat's company possesses a store of bodily energy which, if used, is not likely to be replaced by the rations provided in the lifeboat. It is essential, therefore, that this store should not be wasted by useless exertion or by the development of a bad frame of mind.

Experience has shown time and time again that the comfort, and indeed the chances of survival, of those adrift depend upon the *frame of mind* of the boat's company.

Records of Survival in Recent Months

The officer who brings his whole ship's company to safety, in good physical condition, after a lifeboat voyage is worthy of much greater praise than he generally gets. The publicity accorded to occasional dramatic rescues after very long periods adrift may give the false impression that even if a lifeboat is got safely away conditions are such that few of its occupants can hope to survive. Recent statistics of the Ministry of War Transport show, however, that of boats adrift for more than 24 hours, nearly half have reached safety within five days, and that it is quite exceptional for any lifeboat not to be picked up within three weeks. Once a crew is safely away from the abandoned ship in a lifeboat it is three-quarters of the way to safety.

ROUTINE PREPARATIONS AND PRECAUTIONS IN THE SHIP

Routine inspection of the various life-saving appliances is important. Officers are individually and collectively responsible for the boats they may have to use. Each boat should be inspected before sailing, and the equipment checked item by item. For guidance, a stowage plan for equipment has been issued by the Ministry of War Transport, and the order suggested in this plan should be observed as far as possible.

It must be realised that a number of the resources in the lifeboat may have to be managed by men who are exhausted from exposure, or sick, or possibly wounded. This aspect should be borne in mind, especially when matters such as the fastenings of containers and securing of stores are concerned; wooden gratings and fittings swell in water, and care should therefore be taken in advance to see that they work easily.

Pay special attention to the following points:—

Drinking water and containers. See that tank-lid washers and breaker bungs are tight fitting. Test the bungs of water containers at weekly intervals, to make quite sure that they can be opened easily. Change the water frequently, and in filling the containers allow for ullage during frosty weather.

Brush the inside of tanks with a wash containing equal parts of cement and lime.

Food and containers. See that the tins show no sign of swelling or "blowing," and that they are not seriously indented or rusted. Ensure that the lid washers of provision tanks are intact, and that the fastenings work easily.

First Aid outfit. Inspect First Aid outfits frequently if they are not in hermetically sealed containers; articles which have become damp must be dried or replaced.

Portable wireless transmitter and receiving set. Charge the batteries regularly and keep a careful record of the chargings.

Lamps. Make sure that wicks are kept trim and oil changed occasionally.

Matches should be kept in the lid recess of red flare tin, and enclosed in a bakelite container.

Canvas and cordage. Expose sails, hoods and blankets freely to the air—exclusion of air leads to steady deterioration. Treat wire mast shrouds with fish-oil. Hand test reef points.

Plugs. Keep plugs in duplicate, and indicate their positions by a painted arrow on the benching and thwart above.

Wooden fittings. A hole in the after-end of rudder blade may prove useful for improvising a yoke line.

Wire steering grommets. They should be strong and pliable, the bight being wide enough to allow steering oar blade to pass through.

Painter. Keep the painter made fast well forward so that the boat, when waterborne, rides to the painter and not to the boat-fall. For the quick release of the standing painter, the toggles should be well tapered, and they and the mousing of hooks kept painted white or luminous.

Semi-rotary pump. Keep the spindle greased.

In *cold weather* lay the boat cover over the boat against ice formation on the equipment.

In *hot weather* wet the inside landing edges of boat planks daily, by playing the hose around inside the gunwhale on side benching. Afterwards drain away the water and replace the plug.

See that all gear in lifeboats, including water-breakers, is well secured.

Habits.

Make a habit of:—

(*a*) memorising the latitude and longitude of your ship during each day;

(*b*) noting the prevailing winds and currents throughout the voyage and for the whole area in which you are operating;

(*c*) working out the course you would set if the ship were suddenly lost;

(*d*) having your lifebelt, or emergency kapok waistcoat, always available, even if it means wearing it; make sure from time to time that your red lamp is in working order;

(*e*) sleeping fully dressed, with warm underclothes, extra pullovers or jerseys on or ready to hand, together with weatherproof clothing; keep a pair of dry socks ready wrapped up in a waterproof package, which you could take with you if you had to abandon ship;

(*f*) *not* sleeping on a hatch, even if the weather is hot, when the ship is in dangerous waters, because by doing so you run the risk of being thrown into the sea by the force of the explosion if the ship is hit;

(*g*) carrying tobacco and cigarettes in watertight containers, if you think you could not do without these in a lifeboat.

ACTION IN EMERGENCY

Minimising the effect of explosions

Blast. If bomb hits are expected and duties permit, lie flat on the deck with head and body hard against a ledge side or deck, to minimise exposure both to the blast wave and to fragments, and to prevent being thrown. Standing with the head against something solid offers similar, although somewhat less effective, protection. Heavy clothing tends to cushion the impact of the blast wave against the body; the most severe cases of blast injury are likely to be seen in those who are lightly clad or stripped for action at the time of the incident.

Flash. Burns caused by flash from explosions are common and affect the parts of the body which are left uncovered. Therefore, when there is any risk of flash burns, keep the skin covered as far as possible, if only by thin clothing. The protection offered by your garments is increased if they are wet.

Wireless messages and equipment

Find out if an S.O.S. has been sent out from the ship, and if an answer has been received.

See that the ship's portable wireless transmitter and receiving set are taken into a boat. Remember that they can easily be damaged if dropped; therefore *pass* them into the boat; if you have to drop them, they are less likely to be damaged if dropped into the water, as they are buoyant and, for a time at any rate, will remain watertight.

Instruments, nautical tables and charts

Take your sextant and nautical tables with you in the lifeboat. Special waterproofed charts of the oceans of the world are being issued, showing details of the prevailing winds and currents like those given in the American Hydrographical Charts. If you have already had yours, take them with you.

Clothing

Take waterproof clothing (oilskins, seaman's protective suit, anti-gas cape, or mackintosh) and gather up any extra warm clothing, blankets or Duffel coats. Experience has shown only too often that unnecessary suffering has been caused by lack of clothing when in a boat. Even in the tropics it may feel bitterly cold at night. It is better to carry too much clothing than too little, for it will protect you not only against the cold, but also against the sun. Do not imagine that the weight of this extra clothing will be a danger to you in the water. Modern lifebelts will support a person in the water fully dressed and wearing sea boots. Carry a pair of dry socks in your pocket, in a waterproof package.

Extra water

Water is more important than food; it is of such great importance that you should make every effort to take extra water with you. Improvise containers wherever possible: 40 gallon oil drums can be used; they are easily cleaned and sterilised by steam in the engine room; they should be painted white, *half-filled* with drinking water and stowed on the upper deck ready to float off or be rolled overboard. Fill and take with you water-bottles or similar containers (preferably not of glass). Masters who have appreciated the paramount importance of an adequate water supply have succeeded in improvising stowage for as much as 120 gallons per boat.

Food

You are unlikely to need more food than is stored in the lifeboat, and no extra food should be taken at the expense of extra water and extra clothing. Extra water is of much greater value than extra food.

Release of life-saving appliances

All life-saving appliances should be released, even if they are not needed immediately. The water and stores they contain are valuable and may be picked up later. Gear should be transferred from boats which are damaged or cannot be lowered.

Going Overboard

If you do not get away in a boat, go over the lower side if the ship has listed. If you go over the upper side you will be in danger of being badly hurt by barnacles and marine growths, and of fracturing your ankles by hitting your heels against the bilge keel. When the lower side of the listed vessel happens also to be the weather side take care to avoid being washed back on board, and in this case, if possible, take to the water from the bow or stern, whichever is the lower. Jump into the water feet first; do not dive.

If fuel oil has been discharged into the sea, you should avoid contact with it as far as possible. If you have to jump into the sea, hold your nose. If you have to swim through a patch of oil, keep your head and eyes high and your mouth closed (oil on the surface makes this easier by calming the sea). If you swallow fuel oil, it

may make you sick; and if you get it into your eyes, it may cause inflammation (lasting for a day or two). British naval experience suggests, however, that serious effects have seldom resulted from contact with oil discharged into the sea. Fuel oil coming into contact with wounds and burns has not been found to delay healing.

If you have to jump from the ship into burning oil you may, if you are a good swimmer, be able to avoid being burned if you adopt the following procedure, which has been tested and proved successful. Jump feet first through the flames. Swim as long as you can under water, then spring above the flames and breathe, taking a breast stroke to push the flames away, then sink and swim under water again. Men have been able to get through 200 yds. of burning oil in this way. To be able to do this, however, you will have to remove your lifebelt and other cumbersome clothing.

In the Water

Many men have been drowned through losing their heads and thrashing about in the water. Look for a lifeboat or raft, or some other floating object; swim slowly towards it and get on board or support yourself with it. The danger of injury from underwater explosion is lessened by swimming or floating on the back. Do not exhaust your strength by swimming about uselessly. Your red light will attract the attention of your mates in the lifeboat at night time. Remember that a *red* light indicates a man to be picked up, a *white* light indicates a raft or a buoy. Try to keep near to other survivors when possible.

PROCEDURE IN LIFEBOAT

Routine

Once you have safely got on board your rescue-craft, whether it be a ship's lifeboat or only a Carley float, your chances of winning through have improved enormously. From now on, the way you act will influence your physical comfort while adrift and your chances of survival.

Behaviour. Do not exhaust yourself by getting excited. Do not sing or shout; for by so doing you use up your strength and lose valuable water in your breath. The motion of the craft will jostle you against others, and you may be very tightly packed. Make the best of it, for your survival depends on every one carrying out his routine cheerfully and promptly.

Allocation of duties. It is most important that each officer and man in a lifeboat should be given a job to do, however small. Only the badly wounded or the very exhausted should be excused. There should be a definite routine for the watch-keepers.

The responsibility of the officer in charge is very great, and if he is not supported by other reliable officers or hands, he may have little or no opportunity of sleeping; it is therefore a very great help if two other skilled officers or men with small boat experience are present who can be entrusted with responsible duties. Watches should be arranged, and should be shortened as necessary if exhaustion supervenes.

Early on, the officer in charge should examine all the equipment, articles, etc., contained in the lifeboat.

Clothing. As soon as possible, squeeze out all your wet clothing, but do not take off all your clothes unless the weather is warm and dry and the wind moderate. Undress and dry your clothes layer by layer.

Pay special attention to your feet; if you are wearing boots and socks, take these off, if wet; dry your feet and put on dry socks, replacing the boots when dry enough. If you are wearing sea boots, take them off, empty out any water which may have got inside, and then put them on again. If you are exposed to conditions which may give rise to immersion foot (see p. 18), it will be better to remove boots from the start if the feet can be kept *well-covered and dry* by socks, wrapping and waterproof clothing; if the feet cannot be kept dry, boots should be left on. Once swelling is noticed however, the boots must be removed.

Protection against cold winds, rain and spray. If canvas or wooden screens are available, put them up as soon as possible. Keep on your waterproof clothing, even if your clothes underneath are wet.

Sometimes these measures will not give you sufficient protection, and you will have to share blankets and huddle together to keep warm.

Protection against sun and heat. Rig up an awning if you possibly can, and try to arrange some cover for the man at the tiller.

Do not take off too many clothes; they will protect your skin against sunburn. Do not forget that this also applies to your legs and feet, which should be kept covered or in the shade. Remember that even in cloudy weather you can get badly sunburnt. Protection against tropical sun can be secured by wearing a shirt or vest and some form of headgear kept wet by occasional soaking in sea-water.

Various substances give protection against sunburn. A number of these are available in proprietary preparations, and may be applied to the exposed skin as directed. Fuel oil will not give protection, and greasy preparations such as ointments tend to " fry " the skin and should not be used.

You can protect your eyes against the *glare* of the sun on the water by improvising some kind of eye shade. Thus, you may tie a cloth or bandage over your nose, so that when you look straight forwards it hides the horizon and cuts off glare coming from the water.

If you are wearing special waterproof clothing and get too hot, the fasteners should be opened from time to time.

Work on the boat should be done before the sun is up, in hot weather.

You can bathe once or twice a day, not more often, but you should take care that there are no sharks or other biting fish (barracudas or blue fish) and no stinging jelly fish nor " Portuguese men-of-war " about.

Sharks are not as dangerous as is commonly believed. They may rub against the lifeboat, but they are not trying to overturn it; they are trying to rid themselves of sea-lice. They rarely attack a boat, and can usually be scared off by vigorous splashing, or by a crack on the snout with a boathook or paddle. It is advisable, however, to keep your hands and feet inside the lifeboat.

Pumping and baling. Every effort should be made to get the boat dry as quickly as possible, and to keep it so. (See under " immersion foot," p. 18.)

Water Rations

Control and issue. The officer in charge should take stock of his water supply, including any additional water which may have been brought into the lifeboat when abandoning ship. He must plan the rationing of water with regard to all the circumstances in which he finds himself—total stocks of water, number of men in the lifeboat, time likely to be adrift, and chances of catching rain-water.

Control of water issue should begin from the start. The present water supply in lifeboats gives each man of the boat's full complement 5½ pints. If you are likely to be picked up more or less immediately, a generous supply can be issued at once. If you are not likely to be picked up for, say, a week, there is no need to give any water at all during the first 24 hours unless the men have been sweating, from hot weather or heavy exertion, when the issue of water should begin at once. The ration recommended is 18 oz. per man daily (for methods of measurement, see below). Continue to issue this amount until you have one pint (i.e. 20 oz.) per man in hand, then reduce the ration to 2 oz. per day.

This system of rationing is based on the fact that man's minimum requirements of water, even in conditions where losses are not excessive, are at least 30 oz. (1½ pints) per day. It has been found by experiment that 18 oz. of water per day is the smallest amount needed to keep a man fit for periods customary in lifeboat trips.

The smaller rations usually allowed are 2–8 oz. per man daily; these are of course better than no water at all from the point of view of survival, but they fall so short of the minimal requirements for health that rapid and progressive deterioration is bound to set in from the outset of the trip. Even on long trips with limited amounts of water the risk of loss of life will be less on the new plan than on current practice.

It is obviously foolish, if not indeed dangerous, to ration water on, say, a 60-day basis when the chances of being picked up in 10 days are good. Quite often men are picked up in poor condition owing to low water rations, with considerable stocks of water still in the boat.

The experiences of survivors suggest that it may be helpful to moisten the lips and rinse out the mouth with sea-water, and also to use small quantities for soaking biscuits. There is, however, no doubt that large draughts of sea-water cause death, and even small amounts may prejudice a man's chances of survival on a long voyage. Permission to *drink* sea-water, therefore, should never be given.

The commonly held belief that the administration of sea-water by the bowel relieves thirst is wrong; the practice has, in fact, been shown to be definitely harmful.

Measures. Two sizes of dipper are in use, a large dipper which holds $3\frac{1}{2}$ oz. and a smaller one holding $1\frac{3}{4}$ oz. Measures, graduated from $\frac{1}{2}$ to 2 oz., are also carried in lifeboats and rafts.

Collection of rain-water. If rain falls, catch and preserve every drop you can. If there is abundance, every man should drink his fill. Use the sea anchor, dodgers, boat cover, sails and any other canvas gear that is in the boat. Do not throw away any tin or vessel which can hold water. Think out a plan in advance for the systematic replenishment of tanks, breakers and every other receptacle. If canvas gear is covered with a layer of salt, wash this off with the first lot of rain.

It is useful to keep a special sheet of waterproof material for collecting pure rain water, free from salt.

Sea ice. Pools of water formed from ice melted by the sun may be found on ice floes, and drinking water may be taken from those which have not been made brackish by salt-water spray.

Drinking urine. The drinking of urine is harmful; the practice should be prohibited.

Food Rations

Experience and experiment have shown that if water rations are low the food ration should consist mainly of fats, starches and sugars, and should contain only small amounts of protein. Only small quantities of salt should be included in the food.

Fats are not only the most concentrated energy-bearing foods, but are of value because they have a greater power to allay hunger than any other types of foodstuffs. For these reasons, a biscuit with a high fat content is recommended. The best kind of fat is pure butter fat; it is good to eat and keeps well in air-tight containers, even in tropical climates.

Chocolate and condensed milk are favourite and desirable articles of diet in shipwreck conditions. Meat and other foodstuffs rich in protein increase the body's requirements of water and should be avoided.

A suitable diet for each person per day includes 1 oz. each of high fat content biscuits, condensed milk, chocolate and butter fat. This amount of food is the minimum required; it will not be sufficient to stop loss of weight but it will prevent hunger.

Care of Stores

Keep a very strict watch over the food and water at all times. A trustworthy man should be delegated to take charge of the preservation and rationing of the victuals.

Habits

Drinking and eating. Issue water and food at regular hours. If a watch or chronometer is available, dole out the rations three times a day, at 0700, 1200 and 1900 hours. If the time cannot be estimated accurately, food and water can be issued at sunrise, noon, and sunset.

Make the most of each share-out of water, by keeping it in the mouth for a long time so as to rinse out the mouth; gargle with it, and then swallow.

To make the best of the biscuits, break them up and put the pieces in your pockets; nibble pieces throughout the day. You can soak them in your water ration if you choose.

Condensed milk may be spread on biscuit, mixed with water, or, best of all, taken by itself one hour before the water ration.

Eat, suck, or chew your food slowly..

Spirits, such as whisky, brandy or rum, are of no real thirst-quenching value, and may even be dangerous. They can be given, if available, to men who are severely wounded as a means of securing sleep and easing pain (see later). The liquid contained in the lifeboat's compass should never be drunk; it is poisonous.

Bowels. It is unlikely that you will have bowel action while adrift. This is due to the small amount of food which you will be taking, and need not alarm you.

Urination. You will also not pass as much water as usual. The amount passed falls to about a pint a day.

Smoking. Heavy smokers find that tobacco is soothing, particularly during the night watches. It has no other virtue, and it may increase thirst.

Sleep

Whilst it is possible to go for long periods without sleep, it is important to get regular sleep during your watches off. If you feel cold, crowd together under a canvas cover forward or in a sail cloth or blanket. Whenever possible, oars should be placed on the bottom boards forward, to make a platform where the watch off can lie stretched out under cover. In calm weather room can be gained by lashing oars and spare gear outboard along the gunwhale. The man at the tiller or on watch may find that with increasing fatigue it is difficult to keep awake; under such conditions he should use the energy tablets (see below). It is probably better for all to keep awake when severe exhaustion seems about to overtake a whole party, and energy tablets should then be issued.

It may be dangerous to drop off to sleep in a Carley float, because the risk of drowning is thereby increased, especially if the weather and the water are cold. Energy tablets will help you to keep awake, and are therefore of value in these circumstances.

Energy Tablets

The tablets should contain 5 mgm. of either Methedrine or Amphetamine.

These tablets contain a stimulant. They are not dangerous, but their use requires care and commonsense. They should be regarded as a stand-by for difficult situations, helpful only if used in the right way at the right time.

The officer or rating in command must take charge of them and be responsible for their issue, just as he is responsible for the issue of food and water. It is therefore essential that he should know what can be expected of them, so that he may judge correctly when to resort to their use.

Action of the tablets. The tablets will:

(1) lessen feelings of fatigue and exhaustion, promote alertness, raise the spirits, and prolong the will to " hang on " and live;

(2) prevent sleep.

These effects take about an hour to come on and they last for several hours, but repeated administration cannot prolong the effects for more than a few days.

A few people feel worse or become excitable after the tablets. This is not a serious matter, but such people should be given no more. The majority feel better for them.

When and how to use the tablets. Give out the tablets when hardship is beginning to wear men down and this cannot be remedied by encouragement, rest, or sleep.

In Carley floats, rafts and dinghies:—

If the conditions are:—

(*a*) *Severe from the outset.* Start the tablets at once, giving 2 at sunrise, at midday and at sunset.

(*b*) *Severe at outset, improving later.* Stop the tablets as soon as possible and follow the instructions given for lifeboats (below).

(*c*) *Good from the outset.* Follow instructions given for lifeboats.

In lifeboats:—

The party must be prepared to hold out for long periods, therefore:—

(*a*) *For the first few days*, try to avoid using the tablets at all.

(*b*) *When exhaustion appears to be setting in*, give single doses of 2 tablets for special purposes, e.g. to the man at the tiller or to the look-out, to keep him awake and alert during his watch.

(*c*) *If severe exhaustion overtakes the whole party*, give 2 tablets to all hands twice a day, at sunrise and sundown.

(*d*) *At any time, when a special effort is necessary.* i.e. a spell of hard pulling to make land, give 2 tablets to all hands, to buck them up for a few hours.

The tablets should not be given to wounded men, to excitable or hysterical men, nor to those whose minds are wandering.

THE TREATMENT OF SICK AND WOUNDED

First Aid Equipment and Emergency Treatment

First Aid equipment is carried in most life-saving appliances. The following items are recommended:—

Drugs:

Aspirin tablets.*
'Omnopon' (gr. $\frac{2}{3}$) in 'Tubunic' self-injecting ampoules (= morphine gr. $\frac{1}{3}$).
Tablets of morphine hydrochloride (gr. $\frac{1}{2}$).
Quinine tablets.
Sulphanilamide paste.†

Dressings, etc.:

Field dressings.
Shell dressings.
Elastic adhesive dressing, 3 ins. wide.
Triangular bandages.
Small packets of gauze cut 4 ins. × 4 ins.
Unbleached calico bandages, 6 ins. wide.
Waterproof material (substitute for jaconet).
Cotton wool, 1 oz. packets.
Gooch splinting (assorted sizes).
Safety pins.
Vaseline.
Scissors, blunt-pointed.
Tourniquet.
Unbreakable measure, 2 oz. (graduated).

Although the number of items is small, all the emergencies likely to be encountered can be treated by these means. Morphine and aspirin will deal with all degrees of pain and collapse, from that caused by severe injury to the simple feeling of faint-

* Codeine Compound Tablets (Tab. Codeinae Co. N.W.F.) may be supplied instead.
† Acriflavine 1/100, together with gentian violet jelly and sulphanilamide powder, may be supplied instead.

ness. Acriflavine, gentian violet jelly or sulphanilamide is for local application to wounds, burns, etc., to prevent their becoming septic.

Injuries due to an explosion may be obvious as wounds or flash burns. Other damage, however, may occur to the body which is not obvious to the layman. It is important to be able to recognise the effects of shock; and the main results of this, together with the treatment, are given below. In severe cases artificial respiration, carried out as for apparent drowning (see below), may be necessary.

Sick men are apt to become restless and lightheaded, and are not altogether accountable for what they may do or say. They will not become violent, but they may ramble. They should be humoured, so that they are easily restrained and kept contented. Keep a look-out that they do not go over the side, because sick men sometimes imagine they are back at home or in the ship, and will, for example, want to go and get themselves a drink.

Your first job should be to relieve pain, and you may have to give morphine from your First Aid chest at the earliest opportunity. Injections act more promptly than the tablets.

If brandy is available, it can be given to dying men in order to make their last hours more peaceful.

If you have a death aboard, strip off and divide the clothing amongst the survivors before committing the body to the sea.

Morphine: when and how to use.

This drug relieves pain and promotes sleep. It can be given to men who are wounded (burned, scalded); or who are in evident physical or mental distress; or who are shocked.

Two preparations of morphine may be provided in the First Aid chest:

(i) 'Tubunic' ampoules of 'Omnopon' (= morphine gr. $\frac{1}{3}$) for injection under the skin; the instructions for giving a 'Tubunic' injection will be found in the packages.

(ii) Tablets of morphine, which should either be allowed to dissolve under the tongue or be crunched in the mouth and slowly swallowed.

The advantage of the ampoules over the tablets is that the effect of the drug is produced within 10 minutes instead of half an hour. The tablets are handier, however, and can also be used for diarrhoea.

Do not give morphine to men who are unconscious or semi-conscious.

Aspirin tablets.

These will relieve minor pains in cases where morphine would prove unnecessarily strong or might cause the man to be too sleepy. They are suitable for the pains of sprains, bruises, or mild wounds; or for headaches, jelly-fish stings, and the like.

Two or three tablets may be taken at a time. Bite them up and then swallow. They act more quickly when bitten up than when swallowed whole.

(Codeine Compound Tablets may be supplied instead: the dose is two tablets.)

Treatment of apparent drowning* (the Schafer method of artificial respiration)

The person needing the application of artificial respiration must be at once placed, belly down, on the nearest flat surface (e.g., on the side bench of a lifeboat) the head being turned a little to one side and the arms laid forwards (Fig. 1). Not an instant is to be lost, even in loosening clothing; artificial respiration must begin without a moment's delay and be kept up as long as may appear necessary; in some cases life has been restored after an hour or more of unceasing work.

Position of Operator. To perform artificial respiration place yourself on one side of the patient facing the head, in a full kneeling position, with knees and hips bent. (If the boat is not crowded and there is not too heavy a sea, you may be able to kneel beside the patient on loose timber placed across the thwarts.) Put your

* Adapted, by kind permission of the Royal Life Saving Society, from *Artificial Respiration: Are You Prepared?* (12th edition); thanks are also due to the Society for the loan of the drawings.

hands on the small of the patient's back, the wrists nearly touching, the thumbs as near each other as possible without strain and the fingers passing over the loins on either side, but not spread out (Fig. 1).

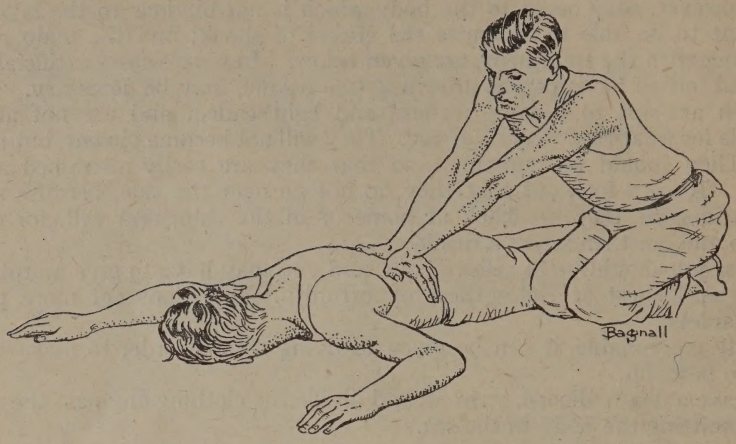


FIG. 1.

Expiration. Then, bending your body from the knees and somewhat straightening the hip joints, swing slowly forward so that the weight of your body is conveyed to your hands (Fig. 2). No exertion is required: the necessary pressure is imparted by the weight of your body. In this way the patient's abdomen is pressed against the bench or floor; the abdominal viscera are forced against the diaphragm; the diaphragm rises and air is driven out of the lungs along with water or mucus which may be present in the air-passages and mouth, and *expiration* is produced.

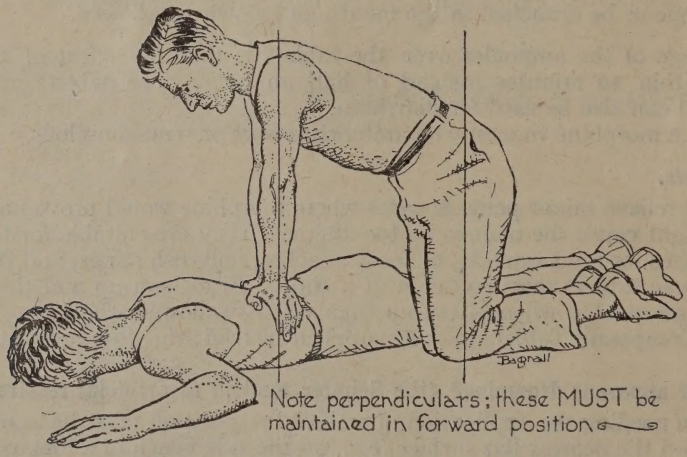


FIG. 2.

Inspiration. Next swing your body slowly backwards to its first position (Fig. 1), thus removing its weight from the hands (which are left in place) and relaxing the pressure on the abdomen. The viscera now resume their former position, the diaphragm descends, the thorax is enlarged and air passes into the lungs, *inspiration* being produced. Repeat the movements regularly about 12 times a minute, swinging your body alternately forwards and backwards from the knees.

Timing. Every such double movement will occupy about 5 seconds—two of which may be taken up by pressure (*expiration*) and three by relaxation (*inspiration*);

to ensure regularity you may count five slowly.* Your arms should be kept straight the whole time, not bent at the elbows. Continue this procedure until there are signs of recovery, shown by the reappearance of natural respirations. If these are ineffective or tend again to cease, artificial respiration must be resumed.

After-Treatment. Keep the patient as warm as you can with blankets and waterproof clothing until he has fully recovered. He must not be turned on his back nor given a drink until his breathing is normal and consciousness is fully restored. Afterwards, he may be encouraged to sleep, lying on his side and warmly covered, but he must be carefully watched for some time to see that breathing does not fail again.

Emergency treatment of wounds

(*a*) Attend to the wounded at the first opportunity.

(*b*) Do not touch the wound with your fingers: they are always contaminated with germs and may cause blood poisoning.

(*c*) Expose the wound, cutting the clothing if necessary.

(*d*) Do not try to remove pieces of metal or bone from the wound.

(*e*) Wash or douche the wound with clean sea-water; this may sting when applied to a raw area, but it is good local treatment. Do not attempt vigorous cleansing of fuel oil from a wound; the oil is unlikely to do harm.

(*f*) If sulphanilamide paste is provided, squeeze a fair quantity on the skin around the wound, and, using a piece of clean gauze, smear it gently all over the wound and on the skin for about two inches around; if sulphanilamide powder is provided instead, dust the wound thoroughly with it.

OR

Pour into the wound half a measureful of acriflavine diluted 1 part to 9 parts of sea-water.

(*g*) Apply a dressing. A field (or shell) dressing is easiest. It consists of a pad of medicated gauze with lint and bandage complete. Keep your hand away from that part of the dressing which is going to touch the wound.

If there are no field (nor shell) dressings, place a piece of gauze soaked in acriflavine diluted 1 part to 9 parts of sea-water, or covered with sulphanilamide paste or powder, next to the wound. Cover it with cotton wool. If waterproof material is available, cut out a piece large enough to cover the wool, and lay it on top of the wool. Bandage firmly. Outside this you may put a layer of adhesive plaster (or elastoplast), to prevent the dressings from getting wet with rain or sea-water.

(*h*) If blood is *spurting out* of a wound, apply an extra large dressing and bandage tightly over the wound. A limb which is bleeding freely should be raised; if the bleeding is not controlled by this means, put a tourniquet on between the wound and the heart, keeping the limb raised in the meantime. The tourniquet should be applied about 4 ins. below the armpit in the case of the arm, and about 4 ins. below the groin in the case of the leg; it should be applied over a layer of clothing or several layers of bandage, *not* in contact with the bare skin. Take the tourniquet off at the end of half an hour and do not re-apply it unless a considerable amount of blood rapidly soaks through the dressing. *It is very dangerous to leave a tourniquet on for too long.*

(*i*) Having dressed the wound, do not take off the dressings again. Should blood soak through the bandage, put some more wool over the dressings and apply another bandage on top of that.

Emergency treatment of broken bones

(*a*) Do not remove the clothes unless there is also a wound nearby. In that case, cut an opening in the clothes over the wound and apply a dressing as above.

* Pressure increasing during 1st second, steady during 2nd second, relaxing during 3rd second; 4th and 5th seconds—patient free from pressure with operator resting.

(*b*) Do not try to set the limb.

(*c*) Select a piece of Gooch splinting large enough to wrap around the broken limb. Get two men to lift and gently support the broken limb; and wrap the Gooch splinting round it, outside the clothes, with the canvas side inwards.

(*d*) Make certain that the hard edges do not chafe nor press against the patient's flesh, by packing pieces of cotton-wool into the gaps between the splint and the limb.

(*e*) Keep the Gooch splinting in place by means of a bandage. Make sure you have not applied the bandage too tightly, by looking out for swelling of the hands or feet; if the parts of the limb below the splint swell, the bandage is too tight and it must be loosened.

(*f*) Give an injection, or a tablet, of morphine.

Burns and scalds (including sunburn blisters and rope burns of the palms)

(*a*) Do not touch the burn with your fingers.

(*b*) Do not prick any blisters.

(*c*) Do not attempt to clean fuel oil off the burn.

(*d*) Apply gentian violet jelly or sulphanilamide paste to the injured part.

(*e*) In cases of burns of the hands (including rope burns of the palms), first wash the burns with sea-water, then pour on acriflavine diluted 1 part to 9 parts of sea-water; then apply either gentian violet jelly or sulphanilamide.

(*f*) Cover the injured part with gauze, wool, waterproof material and then a bandage.

(*g*) Give an injection, or a tablet, or morphine.

Treatment of shock

This is likely to occur after any severe wound, burn, scald, blast, or broken bone. The man will be pale and cold; his breathing may be sighing in type; he will probably be restless; he may or may not be in pain; he may also be abnormally cheerful, and this is an important point to remember, particularly in the case of a man who has lost much blood.

(*a*) Lay the man flat, if possible; do not prop up his head; on the contrary, get it lower than his body, by putting something comfortable in the middle of his back (this will assist the blood-supply to the brain).

(*b*) Raise the legs, by supporting them off the bottom boards or by drawing the feet up to the buttocks.

(*c*) Warm the patient by covering him with extra blankets and coats.

(*d*) Give him a drink of water.

(*e*) Give him an injection, or a tablet, of morphine. The injection, or the dose of morphine by mouth, should not be repeated for 4 hours.

LIFEBOAT AILMENTS

A number of ailments may develop during exposure to sea-water, sun, heat, and cold, and as a result of the shortage of water.

Dry mouth

Dry mouth is a common complaint. You have already been told how to relieve this with the available water, by holding it in the mouth and gargling. Some relief may also be obtained by sucking buttons or a piece of metal such as a coin, by chewing gum, or by greasing the inside of the mouth with butter fat.

Cracked and parched lips

Smear with vaseline.

Cracked skin (from exposure to sun, or incrustation with salt)

This may be prevented by painting on special anti-sunburn lotion (if available). Otherwise, apply sulphanilamide paste or powder, gentian violet jelly, or vaseline.

Salt-water burns (boils)

(*a*) Do not squeeze the boils.
(*b*) Do not let out the matter by pricking them.
(*c*) If the boils burst of their own accord, do not squeeze the matter out of them.
(*d*) Large, angry-looking boils should be covered with a dressing after a solution of 1 part of acriflavine to 9 parts of sea-water, or a coating of sulphanilamide paste or powder, has been applied.
(*e*) In the case of small boils which do not seem to be coming to a head, the acriflavine solution in sea-water may be applied and the boils left exposed to the air.

Inflammation of the eyes (from flash-burns, fuel oil, sunglare, etc.)

(*a*) Smear the upper and lower eyelids with vaseline, and apply a small dab of vaseline to the outer corner of the eye itself.
(*b*) If the eyes are very painful and bloodshot, apply a piece of wool lightly and bandage the eyes.

Fever

If any of the men appear to be feverish, as shown by flushed face, general aching, sweating and shivering (especially in hot weather), a tablet of quinine may be given every 4 hours.

Vomiting

This may be due to the unusual motion of the small craft, or to swallowing fuel oil or sea-water. It is unlikely to continue for very long. After severe vomiting, the patient should lie down and be kept warm with coats or blankets.

Constipation

You cannot expect to have action of the bowels when taking little or no food; you do not need any treatment for this condition—in fact, laxatives will do harm.

Diarrhœa

Give a tablet of morphine by mouth every 4 hours until the loose motions are checked. Should the man become very drowsy, the morphine should be stopped.

Difficulty of urination

There may be some difficulty in passing urine, and the bladder may feel uncomfortably full; dangling the hands in the sea will help urination. In any case, you cannot expect to pass much water when your drinking ration is small. The urine may appear dark in colour and thick. This is only to be expected and need not alarm you.

Swollen legs

Swelling of the legs is a common occurrence in the boat, and is almost universal for a few days after rescue. The condition subsides without treatment and, by itself, is a matter of no importance.

Frostbite

True frostbite is a condition in which the skin and sometimes deeper tissues become actually frozen. Frostbite is *not* the same as immersion foot (see below).

Frostbite is almost unknown unless the temperature of the air is as low as — 10° C. (14° F.), and is frequent only if the temperature is much lower (— 25° to — 30° C. or — 13° to — 22° F.). Frostbite on land occurs only when the ground is hard frozen,

or covered with dry snow or ice. At sea it is very rare unless the sea-water is freezing. Wind encourages and sunlight discourages frostbite at a given temperature.

The damage is caused by minute crystals of ice which form within the skin. Uncovered parts of the skin are affected; the fingers, ears and nose when exposed are those most prone to freeze, and in that order. Frostbite may also affect parts that come in contact with very cold substances, the feet with ice or frozen ground, the fingers with cold metal.

Signs. The skin becomes pale and yellowish white, looks unusually opaque, and feels of wooden hardness; this hardness is the only completely reliable and invariable sign of freezing. The patch of skin so affected usually looks and feels clearly marked off from the rest. The freezing usually happens in skin that is already tingling or numb with cold. The actual freezing occurs quite suddenly, sometimes after a sudden stinging pain or pricking feeling; it is also very apt to pass unnoticed. The frozen patch will get larger if untreated, but the victim will not feel this spread. Skin once frozen remains quite unchanged until it thaws; it will then become inflamed, according to the extent and hardness of the previous freezing.

Reaction. After thawing, the skin at first becomes bright red and hot. A short freeze is followed by itching of the skin, which forms a wheal; this disappears within a few hours. A longer freeze is followed by burning pain and blistering. A severe freeze causes mortification; the mortified area comes away after blackening, and leaves a hole (or ulcer) in the skin. A very severe and extensive freeze will cause death and mortification of the end of the limb affected (usually the foot).

Prevention. Keep as warm as possible; in intense cold wear plenty of clothing, which should be windproof; put on thick gloves and ear protectors.

Keep your feet and socks as dry as you can, and keep your feet moving (to maintain the circulation). Avoid cramped positions.

Do not touch anything made of metal with the bare skin or with the mouth.

Keep the feet and all exposed skin greasy, by rubbing in clean oil or vaseline.

Do not wash yourself too often.

Clip your beard and moustache short; icicles will form on untrimmed beard from the moisture of the breath.

Watch each others' faces for the first signs of patches of frostbite.

You can discover the beginnings of frostbite in your own face by wrinkling it up to detect areas of stiffness. A bare warm hand should be placed immediately on any affected part of the skin.

When passing water protect your parts from the wind and afterwards dry them carefully.

Small frozen areas may be thawed rapidly by covering them with a warm hand; they require no subsequent treatment.

If there are larger and more severe areas of frostbite, such as a whole foot, thaw the part gently, by placing it inside a companion's clothes. Do not rub frostbitten skin with snow or otherwise.

(*Treatment of frostbite after rescue* is given on p. 21.)

Immersion foot

When the feet or legs are immersed for many hours in cold water or mud, the tissues very gradually suffer damage. The colder the water, and the longer the immersion, the greater is the damage to the tissues. Sea-water cold enough to injure is usual in the Atlantic (winter and summer) from latitude 50° northwards.

Signs. Immersion in water cold enough to cause damage is distinctly painful, but this pain is not usually severe and soon lessens. Within half an hour, the immersed part is red and numb, and it becomes difficult to move the toes. This numbness and weakness get worse, and within three hours the limb is a little swollen. The swelling increases with time, and especially if the limb is hanging down. All these early signs of damage quickly disappear if immersion ends and the limb can be

warmed. If, however, the immersion has lasted for several days, the signs of damage will be more serious and last longer; in such cases blisters or dark patches may appear, and the skin may become broken.

Prevention. Make all efforts to avoid these discomforts and disabilities, which may lead to the risk of more permanent damage. The damage comes from cold, and the chief source of cold in boats is cold water.

Keep your feet out of water, by keeping the bottom of the boat as dry as possible, or by raising the feet.

Even if you are wearing sea-boots, the less that water touches these boots the better; cold from the water will penetrate through them.

If your socks have become wet, empty your boots, wring out your socks, and put them on again quickly; if you carry dry socks, put these on instead of the damp ones.

Try frequently moving your feet and toes.

Unless it is fairly warm, do not bare your feet to rub them; the exposure to the air will cool your feet more than the rubbing will warm them.

If you rub the feet, do so very gently. Rubbing the skin when it has become swollen, numb, or tender will do more harm than good. Greasing the feet is not of much use.

It is extremely important to keep the upper parts of the body warm; this also helps to keep the limbs warm.

It is better to keep damp or wet clothes on the body under waterproof covering than to strip and wring out the clothes in a cold wind.

Do not wear tight garters, suspenders, tight boots, or any other tight clothing on the legs or round the wrists.

(*Treatment of immersion foot after rescue* is given on p. 21.)

STEPS TOWARDS RESCUE

If you cannot get quickly to land, the important thing is to get on to a sea or air route where the chances of being picked up are increased. The precise line of action will depend on the position of the ship when lost, and on whether signals have been sent out and answered.

Navigation

If a signal has been sent out from the ship and *an answer received*, put out the sea anchor and try to remain in the vicinity long enough for a rescue ship to reach the position. Should heavy weather prevent this, stream the sea anchor from the stern of the boat, hoist a small head sail, and steer the boat before the wind and sea.

If you have reason to doubt whether ships can be risked on the scene of enemy action, a course should be shaped to safety.

Reference has been made to the need for having in mind at all times a planned course. The Master should make arrangements for the officers and ship's company to be informed in advance of the course to steer should they have to take to the ship's boats. This is usually done every day, the instructions being varied according to circumstances and the ship's position.

If you have followed the advice given earlier, you should be able to recall the latitude and longitude of your ship at the time she was lost. You should then make the best use of prevailing winds and currents, having made a special point of learning these for the waters in which you have been operating.

The lifeboat is not a fast sailing craft in tacking to windward, so that if an adverse current is also expected, the longer course with favouring winds (and less physical effort) may prove more successful.

If the wind fails the sail should be kept up to attract attention.

Pulling

It is never justifiable to attempt to make progress by continuous pulling. The energy expended cannot be made good by the food and water rations available.

The trivial gain in distance will be far outweighed by the early exhaustion of the crew. Where, in exceptional circumstances, pulling is unavoidable, experience has shown that spells at the oars not exceeding 15 minutes, alternated with 1 hour rests, will permit steady progress for long periods with the minimum of exhaustion.

Attracting attention

A strict look-out should be kept from the boat at all times.

Do not be extravagant with your red flares, smoke signals or rockets, as their number is limited. They should be under the immediate control of an officer, who should see they are not used wastefully. If an aircraft is seen or heard *in the vicinity*, wait until it is heading in your direction before you fire a rocket or flare, and remember that you can *hear* an aircraft long before you can see it.

Remember, too, that you can see an aircraft some time before its occupants are likely to see you; do not, therefore, fire your rocket or flare until it is fairly close to you. Be prepared to fire a second rocket or flare to confirm your first.

If you have no rockets nor flares, you can often make yourself conspicuous to aircraft by churning up the sea with oars or paddles.

If you possess a W/T set do not run it down by sending out frequent signals, for the battery has only a short life. The water-tight battery, supplied with the set, is designed to last for 48 hours automatic intermittent sending. Make sure the instrument is correctly tuned to suit the aerial used.

If practicable, transmit S O S's during international distress periods, the times of which are 15–18 minutes and 45–48 minutes past each hour G.M.T.; distress signals are more likely to be picked up during these periods.

Mirages

Men adrift, especially in Northern latitudes, sometimes imagine they can see things which are not there, such as smoke, sails, ships, or land. This is the same phenomenon as occurs in the desert, and, if you experience it, it does not mean that you are out of your mind or even lightheaded. It does indicate, however, that you must make very sure that all of you see the same object before wasting your strength in pulling towards it.

TREATMENT AFTER RESCUE

When picked up after being adrift you will require drink, food, warmth, and sleep. If a Medical Officer is carried aboard the rescue-vessel you can safely leave the direction of these matters in his hands. If there is no Medical Officer aboard, certain commonsense rules of health must be followed.

Drink

A good draught of fluid—hot or cold—is one of the first things required. Any drink will do. You cannot do yourself much harm however much you drink—the worst you can do is to make yourself vomit.

Food

You must be sparing in your consumption of food at first, and choose something light and easily digestible. Bread and milk; a bowl of thick soup, are suitable. Three or four days later you can go on to something more solid. If you eat too heavy or too big a meal at first, you are liable to get indigestion.

You will probably remain constipated for a few days; do not worry about it.

Warmth

If you feel very cold, you can warm yourself up by hot drinks and by sitting in a warm place, but if your legs are numb and swollen, you are probably suffering from "immersion foot" and must take great care what you do. The treatment of immersion foot is given below in detail. Great care must also be exercised in treating frostbite.

Treatment of frostbite

The best way of thawing the part is to put it in *cold* (not warm) water, with the rest of the patient warmly wrapped up. On thawing, the skin will at once soften and will quickly become pink or red. Rubbing with snow or otherwise—or any kind of massage—is dangerous.

If pain is severe on thawing, cool the part again for a little while with cold water, ice or snow. After thawing, warming up must be very gradual; it is dangerous to apply hot water or bottles, or to warm the limb in front of a fire.

Clean and dry the affected part most gently; dust it carefully with sulphanilamide powder and wrap it in clean material.

Afterwards keep the part at absolute rest.

Do not open any blisters or other breaks in the skin; this is a matter for the Medical Officer.

Keep the body warm, but the damaged part cool.

See that the patient has a hot meal.

Treatment of immersion foot

The following treatment of immersion foot must begin immediately after rescue from boat or raft.

Lift the patient on board the rescue vessel; remove all clothes from his body and wrap him in warm blankets.

Hot bottles may be placed near the body between the blankets, but none should be allowed to come near the affected limbs, which should always be kept cool. The limbs may be cooled by the use of fans and even ice in case of necessity, but the ice should not be brought into direct contact with the skin. While it is desirable that the temperature of the skin should be reduced to about 80° F., it is highly undesirable that it should be reduced much below 70° F.; the skin temperature should therefore be taken, by placing a bath thermometer against the skin, under a covering of cotton wool. The limbs will swell again if allowed to warm up too soon.

Handle the limbs very gently and allow them to warm up only gradually; heating or rubbing them in any way is harmful.

Continue the treatment until all swelling has gone and the patient is able to walk without pain, or until he comes under medical attention.

Dust all blisters, open sores, or darkened areas of skin with sulphanilamide powder and cover with clean dry cloths. Keep the feet and legs quite dry and do not apply any lotions, ointments, or antiseptic, except the powder recommended above.

WELLCOME LIBRARY INSTITUTE

B2144. Wt. 1975 75 000 1/43. U.B.L. G428. S.O. Code No. 45-9-8